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Outcome of temporal lobectomy for hippocampal sclerosis in older patients

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ABSTRACT

Patients of 50 years or older account for a small but significant portion of the patient population that receives surgical treatment for epilepsy. There have been few studies reporting surgical outcomes from temporal lobectomy in older patients. We examined seizure outcome and surgical complications after anterior temporal lobectomy for temporal lobe epilepsy with pathological evidence of unilateral hippocampal sclerosis. Two patient groups were compared in this study: patients 50 years or older (mean age 55.5 years old, $n = 16$) and patients less than 50 years old (mean age 32.9 years old, $n = 184$). After a minimum of one year follow up, younger patients (79.4%, $n = 146$) were significantly more likely to be seizure-free ($p = 0.041$) compared to older patients (56.3%, $n = 9$). There was no significant difference ($p = 0.404$) between the two age groups in the percentage of patients withdrawn from medication following surgery. Surgical complications were significantly higher in the older age group compared to the younger age group ($p = 0.009$), although there was no permanent morbidity. Thus, while surgical treatment of temporal lobe epilepsy with unilateral hippocampal sclerosis is still beneficial in older patients who are refractory to medical therapy, surgical treatment should be considered at as early an age as possible, to maximize the chance for a better outcome with fewer complications.

1. Introduction

Temporal lobectomy for medically refractory temporal lobe epilepsy (TLE) can result in a patient becoming seizure-free.[1] Older adult patients account for a very small percentage of patients who receive surgical treatment for epilepsy. Previous studies of surgical outcome for the elderly have included various etiologies and have shown comparable or less favorable outcomes than for younger adults.[2–7]

The aim of this study was to evaluate the seizure outcome in patients of 50 years of age and older undergoing temporal lobectomy with pathologically proven hippocampal sclerosis. Results were compared to younger patients operated on during the same period.

2. Methods

2.1. Patient selection

We retrospectively reviewed patients who had undergone surgical treatment at King Chulalongkorn Memorial Hospital between January 2004 and March 2009 for temporal lobe epilepsy that was medically refractory. Study inclusion criteria consisted of patients who were 16 years or older, had unilateral hippocampal sclerosis that was pathologically confirmed and no other lesions detectable on magnetic resonance imaging (MRI). All patients had a minimum of 1-year follow-up.

2.2. Preoperative evaluation

All patients underwent a complete neurological history and physical examination, MRI and 24-h scalp video electroencepha-

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Table 1
Patient's demographics.

Variable	Patients < 50 year *n*/*N* (%); mean ± SD (range)	Patients ≥ 50 year *n*/*N* (%); mean ± SD (range)	*p*-Value
Sex			0.243[a]
Male	87/184 (47.28%)	10/16 (62.50%)	
Female	97/184 (52.72%)	6/16 (37.50%)	
Onset of seizure (years)	13.10 ± 7.70 (0.25–39)	24.69 ± 18.19 (1–60)	0.019[c]
Duration of seizure (years)	20.07 ± 8.90 (1–44)	30.81 ± 16.01 (7–52)	0.010[c]
Age of surgery (years)	32.89 ± 8.15 (6–49)	55.5 ± 5.77 (50–72)	
Febrile seizure	122/184 (66.30%)	8/16 (50.00%)	0.190[a]
Side of surgery			0.324[a]
Right	80/184 (43.48%)	9/16 (56.25%)	
Left	104/184 (56.52%)	716 (43.75%)	
Seizure types			
Auras	142 (77.17%)	11 (68.75%)	0.538[b]
Complex partial seizures	174 (94.57%)	15 (93.75%)	1.000[b]
Generalized seizures	141 (76.63%)	11 (68.75%)	0.542[b]
Noninvasive EEG findings			
Concord. interictal + ictal EEG	117 (63.59%)	8 (50%)	0.282[b]
Concord. ictal EEG only	38 (20.65%)	7 (43.75%)	0.055[b]
Concord. interictal EEG only	10 (5.43%)	1 (6.25%)	1.000[b]
Discord. interictal + ictal EEG	19 (10.33%)	0 (0%)	0.373[b]
Off antiepileptic medications	56/184 (30.43%)	3/16 (18.75%)	0.404[b]
Length of follow-up (years)	2.85 ± 1.43 (1–6)	2.52 ± 1.43 (1–5.5)	0.333[c]

[a] Pearson chi-square (df = 1).
[b] Fisher exact test.
[c] Mann–Whitney *U*. Concord. Interictal EEG, >90% of interictal EEG ipsilateral to hippocampal sclerosis; Concord. ictal EEG, ictal EEG onset concordant with hippocampal sclerosis; Discord. interictal + ictal EEG, <90% of interictal EEG ipsilateral to hippocampal sclerosis and ictal EEG onset discordant with hippocampal sclerosis or nonlocalized.

lography (EEG) monitoring. Wada test, single photon emission tomography (SPECT) and positron emission tomography (PET) were performed on selected patients.

2.3. Surgical procedures

All patients in the study underwent anterior temporal lobectomy. The procedure includes amygdalohippocampectomy and the resection of the anterior temporal neocortex (4–5 cm from the temporal tip in the non-dominant hemisphere and a 3–4 cm in the dominant hemisphere). Invasive monitoring with implanted subdural electrodes was performed whenever noninvasive recordings were discordant. All surgery was performed by a single neurosurgeon and all resected specimens underwent pathologic examination.

2.4. Outcome assessment

Data were retrieved from the institutional epilepsy data bank, which documents outpatient clinic visits. Seizure outcome was classified according to Engel's classification[8] based on the last postoperative seizure. Patients were designated as 'seizure-free' if in Engel class 1 or 'not seizure-free' if in Engel classes 2–4. Complications related to surgery were compiled for the study except superior quadrantanopsia, which was not considered a complication.

2.5. Statistical analysis

The Pearson chi-square, Fisher's exact test or Mann–Whitney *U* test (when appropriate) were used to test for significant differences between two age groups: below 50 years and 50 years or older. Univariate analysis was used to compare the seizure outcome between these two groups and factors associated with outcome. Results were considered to be statistically significant when the p value was less than 0.05.

3. Results

3.1. Demographic data

A total of 200 patients fulfilled the inclusion criteria. Sixteen patients were older than 50 years (mean age, 55.5 years; age range, 50–72 years) and 184 patients were younger than 50 years (mean age 32.9 years; age range, 16–49 years). There was no significant difference in gender, side of surgery, length of follow-up or history of febrile seizures between the two groups (Table 1).

The mean onset of seizure was 13.1 years in the below 50 age group and 24.7 years in the older group ($p = 0.019$). The mean duration of epilepsy prior to surgery was 20.0 years in the below 50 age group and 30.8 years in the older age group ($p = 0.010$). In order to determine independent predictors of outcome, we performed univariate analysis for: gender, side of surgery, onset of seizure, duration of epilepsy, age of surgery, and history of febrile seizures. None of these parameters proved to be predictors associated with outcome, although the duration of epilepsy had the trend of being statistically significant ($p = 0.061$).

3.2. Seizure outcome

Seventy-seven percent of all the studied patients were seizure-free. Seizure outcomes in the older group were as follows: class 1 in

Table 2
Univariate analysis of seizure outcome.

	Patients < 50 year *n*/*N* (%)	Patients ≥ 50 year *n*/*N* (%)	*p*-Value	OR (95% CI)
Seizure outcome			0.041*	0.33 (0.12–0.96)
Seizure free	146/184 (79.35%)	9/16 (56.25%)		
Not seizure free	38/184 (20.65%)	7/16 (43.75%)		

* Seizure outcome was statistically significant ($p < 0.05$) between the two age groups of patients.

56.2%, class 2 in 18.8%, class 3 18.8%, and class 4 in 6.2% of patients. Seizure outcomes in the younger group were as follows: class 1 in 79.4%, class 2 in 9.2%, class 3 in 9.8%, and class 4 in 1.6% of patients. Patients over the age of 50 years were less often seizure-free following temporal lobectomy than those of younger age ($p = 0.041$) (Table 2). Three patients in the older group (18.8%) and 57 patients in the younger than 50 age group (31%) had discontinued antiepileptic medication ($p = 0.404$).

3.3. Complications

Postoperative complications in the older age group were significantly higher than in the younger age group ($p = 0.009$). Complications occurred in four older patients (25%) including three cases of subdural hygroma (two patients underwent surgery and one refused surgery) and one chronic subdural hematoma that required surgery. Operative complications in the younger age group occurred in 8 patients (4.4%) including one with meningitis, one with diplopia, one case with CSF leak, two cases with hemiparesis that resolved within months, two cases with a remote cerebellar hematoma not requiring surgical intervention and one with a remote epidural hematoma that needed evacuation. There was no permanent morbidity and no mortality in either age group.

4. Discussion

The seizure outcome of temporal lobectomy for hippocampal sclerosis in our study is comparable to that in previous reports.[9,10] In older patients, surgical treatment of TLE had a seizure-free outcome comparable to younger patients.[3,6,7] Sirven et al.[4] reported freedom from seizures in 16 of 30 patients (53%) older than 50 years who underwent temporal lobectomy. Cascino et al.[2] reported 3 of 6 patients in the older patient group were seizure-free after temporal lobe surgery. Grivas et al.[6] reported no difference in seizure-free outcome between their younger age group and patients older than 50 years following surgery for TLE. McLachlan et al.[3] and Boling et al.[7] found a comparable outcome in older age and younger age groups although there was a trend towards greater freedom from seizures in younger patients. The limitation of these studies is the heterogeneous etiologies of TLE in the patients included.

A recent study of surgical treatment for TLE from hippocampal sclerosis in older patients with long-term follow-up found a comparable seizure free rate in older patients (Engel 1 81%) and young patients (Engel 1 83%).[5] The demographic data of patients in that study were similar to our study, plus all patients had undergone a uniform surgical resection by the same surgeon. Our study showed fewer patients seizure-free (Engel 1) in both the older and younger age groups, but the follow-up period (a minimum 1 year follow-up) in our study is shorter than that for the other study (a minimum 5 year follow-up). Some initially non-seizure-free patients may achieve freedom from seizures after long-term follow-up.[11,12] Thus, longer follow-up and larger numbers of older patients may be needed to compare our series to this other series.[5] Patient selection may also account for the differences.

There are conflicting results in the literature on whether the duration of epilepsy affects outcome. Previous studies did not find any association between the duration of epilepsy and seizure-free outcome in TLE patients older than 50 years[7] nor in patients with TLE from hippocampal sclerosis.[5,13,14] In a study of surgical outcome in patients with TLE from hippocampal sclerosis, Janszky et al.[15] found a longer epilepsy duration predicted a poorer long-term outcome. In our study, duration of epilepsy was not a predictor of seizure-free outcome but age at surgery was. The duration of epilepsy in the older age group was significantly longer than the younger age group. A longer duration of epilepsy may lead to a higher incidence of secondary epileptogenesis[16] and can be associated with chronic structural and functional abnormalities.[3,17] This may account for the slightly less successful outcome of surgery in older patients. The data suggest that surgery should be performed at an earlier age once patients have become refractory to antiepileptic medications.

The complications of temporal lobectomy in the age group of patients 50 years and older is reported to be low and comparable to younger patients.[3,5,7] Complications were mild and in most cases transient. Boling et al.[7] reported a 6% complication rate in patients older than 50 years. Grivas et al.[6] reported a 7.7% complication rate with 3.8% permanent neurological deficits after surgery for TLE in elderly. Our 6% rate of surgical complication is comparable to previous reports on epilepsy surgery.[18,19] Rydenhag and Silander[19] reported an 8.1% rate for minor complications and 2.7% for major complications after temporal lobe resection including mesial structures. Behrens et al.[18] reported a 7.5% rate for surgical complications and 4.7% for neurological complications after temporal lobe resection. In a Swedish multicenter study, the risks of major complications following epilepsy surgery were higher for patients older than 35 years.[19] In our series, surgical complications in older patients were related to subdural collections. Atrophic brain in the elderly may be a factor predisposing to complications in this age group. However, there was no mortality or permanent morbidity. Improvement in neuroanesthesia, microsurgical techniques and postoperative monitoring of patients has decreased the morbidity and mortality in older patients.

5. Conclusion

Surgical treatment of TLE with hippocampal sclerosis in elderly patients offers the chance of being seizure-free although less likely than in younger patients at short-term follow-up. Older age is not a contraindication to epilepsy surgery but the risks are higher than for younger patients. Our data support the concept that once a patient is refractory to medical antiepileptic treatment, surgery should be performed at as young an age as possible to maximize the chance for freedom from seizures.

Conflict of interest

The authors declare no conflicts of interest.

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